Gingival Recession on the Lingual Surface Causes of Development

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Abstract

Aim is to consider and analyze the possible causes of the development of localized gingival recession on the lingual surface, which can come to the aid of preventing this pathology so that reduce the risk of its occurrence.

The publications in the electronic databases Google Scholar and PubMed were studied during a review of the literature, authors have selected articles the content of which concerns the study of the etiopathogenesis of gingival recession on the lingual surface.

134 articles we reviewed during the review. After analyzing the literature for inclusion criteria, the total number of publications has become 55.

Conforming to the studied literature, gingival recession from lingual surface was determined to be a late complication caused by tongue piercing, ankyloglossia and orthodontic treatment including lingual orthodontic appliances.

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Introduction

Gingival recession is defined as the apical shift of the gingival margin with respect to the cementoenamel junction (CEJ); gingival recession can be localized, generalized or even be associated with one or more surfaces [1]. This pathology has multifactorial etiology and may be caused by primary and secondary factors [2,3]. Plaque-induced inflammation is one of the main factors [2]. It is considered that on the lingual side of mandibular anterior teeth gingival recession is more common due to more difficult oral hygiene, rapid formation of calculus on the lingual sites due to opening of salivary ducts [4]. Anatomically, the alveolar bone becomes thinner from the posterior to the anterior region in the mandible [3]. Crowding of the frontal group of teeth of the mandibulae is also a risk factor [5]. In this literature review, scientific data on the causes of gum recession from the lingual surface were investigated. Many authors have assumed that the reason supragingival calculus tends to form preferentially on the lingual surface of the six lower anterior teeth is because saliva from the adjacent submandibular ducts is a source of calcium and phosphate ions and because loss of CO2 as the saliva enters the mouth increases the local pH [6]. Lingual recession in the area of mandibular anterior teeth is a commonly encountered and often ignored clinical scenario. Inflammation caused by calculus, prominent lingual frenulum and deleterious habits are the most common etiological factors [7].

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Materials and methods

This review article was written during a search in the electronic databases of Google Scholar, PubMed.

Search terms included "recession", "lingual", "ankyloglossia", "intraoral piercing", "lingual retainers", "complications of orthodontic treatment".

Publications were included based on the

following inclusion criteria:
1. The full text of the article is available in English.
2. Studies have only been conducted on humans, excluding animal studies.
3. Articles where there is a description of the causes of a localized recession.(Table 1)

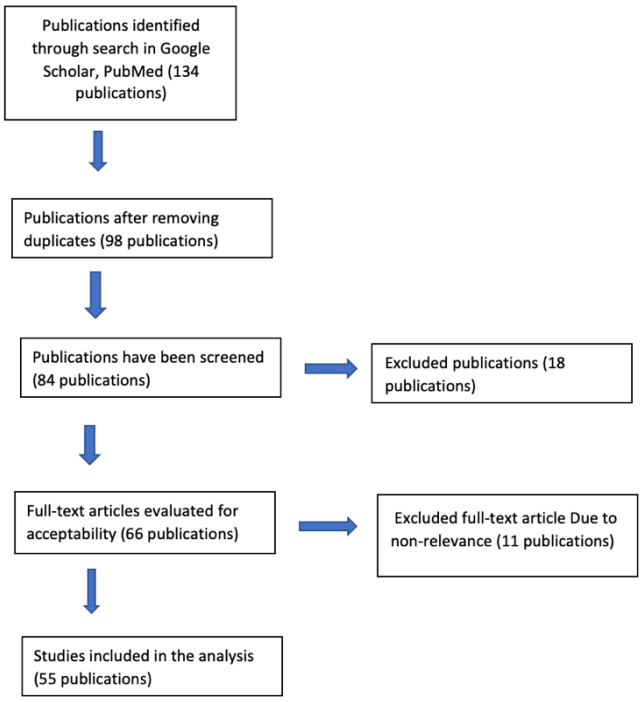

Table 1. Article selection process

Results

134 articles were reviewed, 56 of which were on the PubMed database, 78 on Google Scholar. Having made the selection according to the exclusion criteria, the total number of publications was 55. In the selected articles, gingival recession on the lingual side and its causes of development was analysed.

Discussion

Intraoral piercing

Unfortunately, piercings are most often done by persons without a license and without knowledge of the anatomical features of the human structure [8]. Almost half of the people (46.8%) who got pierced were not informed about subsequent complications. About 70% did not know such complications associated with the gums. Campbell and all divided the complications associated with wearing a piercing into early and late. Late complications are the most frequent. Gingival recession is a late complication [9].

Tongue is the most prevalent intraoral piercing site, typically pierced at the midline and just anterior to the lingual frenulum [8,10]. Lingual surfaces of anterior teeth in the lower jaw most often affected [11]. Tongue piercing is the primary etiologic factor for the gum recession from lingual side of mandibular incisors [10,12,13,14]. The trauma, not the plaque biofilm is perceived as the primary cause of the periodontal inflammation [12]. But it is also worth noting that piercings are a reservoir of bacteria, including periodontal pathogens [9]. Wearing a tongue piercing increases the risk of occurrence gingival recession in the anterior lingual mandibular region 11 times [13].

The severity of localized periodontal destruction increases according to years of wear and the barbell's stem length. Lingual recession was found on mandibular central incisors in 50% of subjects wearing long barbells for 2 or more years [10]. Piercing habits as biting, rolling, stroking, sucking significantly affected the prevalence of dental defects and gingival recession [14].

Tongue piercing is associated with lingual recession of mandibular anterior teeth and chipping of posterior teeth. Long-term use of a tongue barbell increases the prevalence of these complications. Barbell stem length appears to differentially affect prevalence of recession and chipping. Since the overwhelming majority of subjects with tongue piercings are young adults, cessation efforts are needed to target this population [10,13,14].

Ankyloglossia

Ankyloglossia, also known as tongue-tie, is a congenital anomaly characterized by an abnormal, short lingual frenulum [15,16]. Some studies mention that the etiopathogenesis of ankyloglossia is unknown [2,17]. Tongue-tie may lead to various functional complications like abnormal speech, malocclusion, midline diastema, mandibular lingual gingival recession, inability to swallow the food which could entail difficulty in the normal life activity of an individual [18]. Ankyloglossia as a cause of gingival recession from the lingual surface is the subject of controversy in the literature; The reason for this is the small number of studies, since ankyloglossia is often treated in childhood and this pathology is rare in adults [19]. Some authors consider that there is not enough evidence to support the theory that a high frenal lingual insertion due to a short attached lingual frenulum

can cause lingual recession concomitantly with or without gingival inflammation, so as a result a direct association is not clear [2,10]. However, some studies have found a significant association between insertion of lingual frenulum in attached gingivae and gingival recession [15,20,21,22]. Arguing that frenectomy improves gum health [23,24,25]. Some authors have used frenectomy to prevent lingual gingival recession of the mandibular central incisors [2], while other authors believe that frenectomy should not be regarded as the first choice for treatment of gum recession [22,26]; Also, there are studies that show that as a result of a strong attachment of the frenulum of the tongue to the attached gums, a diastema can develop between the central incisors [16,27-30], which can later cause destruction of the periodontium due to food trauma [31]. Limited tongue movement impedes the self-cleaning of anterior teeth and lips, resulting in poor oral hygiene, as it is difficult to sweep food debris from tooth surfaces[25].

There are also reports that ankyloglossia makes performing oral hygiene difficult and due to the difficulties in cleaning, caries lesions, periodontal pockets, and gingival recessions have been reported [32]. In such cases frenectomy is essential. Abnormal attachment of the frenulum can also be associated with various syndromic and non-syndromic conditions [33]. Ankyloglossia can occur in disease such as Hutchinson–Gilford progeria syndrome [34]. Severe recession in the mandibular anterior region associated with a high frenum attachment is also common in Down syndrome [33].

Lingual retainers

Retention is the final component of orthodontic treatment and is vital in ensuring the long-term maintenance and stability of the esthetic and functional results [35]. Removable retainers have been used by clinicians since the early years of orthodontic practice. During the last decades, an increasing number of cases are retained with bonded lingual retainers. A comparable limited gingival inflammation can be found in the presence of both types of retainers. Usually, slightly more plaque and calculus are present on the lingual surfaces in the fixed retainer group [36,37,38]. Lingual retainers are widely used to maintain stability and avoid relapse after orthodontic treatment [39]. The most common types of retainers used for retention in the mandibular arch are fixed bonded retainers from canine to canine, removable vacuum-formed retainers covering all teeth, or mandibular Hawley retainers [35]. With the development of digital technologies, they also began to be used CAD/CAM fabricated nitinol retainers. The study showed that nitinol retainers showed significantly less biofilm formation compared to twistflex retainers, which has a positive effect on periodontal health Further clinical studies are needed to assess the long-term effects of lingual nitinol retainers and for generalizability of the study results [40]. There was no difference in the health of the gums and periodontal tissues in the mandibular anterior-lingual region both with Memotain, which are also manufactured with CAD/CAM technologies, and with five-strand retainers [39]; Even though retainers are often used in orthodontic practice, the impact retainer on the gums in the long term has not been fully studied [41]. The results of Pandis's study suggest that the placement of lingual fixed retainers for long periods promote calculus accumulation, marginal recession, but has no effect on plaque and gingival indices or bone level. Calculus accumulation relates to the increased availability of retentive sites for microbial colonization, which are being calcified at a later stage. It is probable that retainers increase the calculus presence through the resin margins, which extend lingually to the free gingiva, offering a substrate favoring biofilm precipitation [42]. The authors of a recent systematic review concluded that there is no high-quality evidence to recommend the use of one type of orthodontic retainer (fixed or removable) in relation to the impact on periodontal health [43]. It is difficult to conclude from the reviewed studies whether fixed or removable orthodontic retainers affect the onset or progression of lingual gingival recession. Factors such as the duration of retainer use, the number of bonded teeth, and the position of fixed retainers relative to their proximity to the gum tissue are not fully understood but may have an impact on gingival recession [35]. It is undeniable that meticulous oral hygiene and regular dental care remain the gold standard in maintaining periodontal health and preventing gingival recession [37].

Orthodontic treaded patients

The association between orthodontic treatment and development of gingival recession is unambiguous. Anterior mandibular teeth are the ones most prone to gingival recession [3,45,46]. The literature often describes the relationship

between orthodontic treatment and labial recession and much less research on lingual recession [7,46,47,48]. A possible explanation for this may be that because of orthodontic treatment, the gum from the vestibular side is more often affected [49].

However, studies have been found that describe the possible causes of recession on the lingual side due to orthodontic treatment; Orthodontic appliances complicate oral hygiene and serve as retention objects for plaque accumulation [50, 52]; The lingual technique is often indicated in patients with a predisposition to gingival recession. With lingual brackets, the risk of gingival inflammation is transferred to the lingual aspect, where bone resorption and gingival recession as noted are generally less frequent. However, lingual brackets showed higher plaque retention compared to labial orthodontic appliances due to difficulty with oral hygiene maintenance, proximity of the brackets to the gingival margin, and failure to remove the flash paste (the excess of adhesive that flows toward the gingival sulcus during the indirect bonding process), which directly increases the risk of gingival inflammation, and by the time can lead to the destruction of periodontal tissues [51,52].

Another reason for the occurrence of recession of the gums of the lower incisors from the lingual surface is proclination of lower incisors of 10° or more either by orthodontic tooth movement or displacement of whole alveolar process. The study showed that in this case, the risk of a recession on the lingual side increases 17 times, explaining that that proclination of lower incisors will induce stretching of lingual gingival fibers and tissue, whereas compression takes place at the labial side. Stretching of gingival fibers might be possible up to a certain degree of proclination before disruption takes place [3,47,48]. Whereas authors of other studies did not find relationship between the amount of mandibular incisor proclination during treatment and the amount of gingival recession either during or after treatment [53, 54]. Orthodontic treatment with premolar extractions is also a subject of controversy. Geometric morphometric analysis showed that orthodontic treatment with the removal of premolars causes significant changes in the shape and thickness of the alveolar bone around the mandibular incisors, especially on the lingual side [55]. According to another study, the authors noted a weak relationship between the extraction of premolars and lingual recession [49]. There is some evidence that increased symphysis height (Me-Wcrest), and ratio between the symphysis height and the width at the crest level as well as big change of lower incisor inclination during treatment are associated with the development of recessions from lingual side of teeth 3.2 and 4.2 [47]; Excessive forward tooth movement during orthodontic treatment can cause alveolar bone loss around the lower incisors [44,50]. As a matter of fact, most of the articles reviewed in this systematic review found that thin gingival biotype is a factor in causing recession and an accurate assessment of biotype before starting orthodontic treatment is essential [45,54,55].

	he most frequent age group	Connection with plaque accumulation	Role of chronic traumatization	Treatment and prevention
Intraoral piercing	young adults	Indirect/ direct	obvious	Prevention= avoiding the procedure Treatment= soft tissue augmentation
Ankyloglossia	children	indirect	chronic traumatization not observed	Prevention= early detection of pathology during dental examination Treatment= frenectomy
Lingual retainers	any	direct	chronic traumatization not observed	it is necessary to teach patients the correct technique of brushing their teeth and help them in the selection of individual oral hygiene products
Orthodontic treaded patients	any	direct	obvious	it is necessary to teach patients the correct technique of brushing their teeth and help them in the selection of individual oral hygiene products

Table 2. Summarizing of etiological factors.

Conclusions

Within the limits of this study, localized gingival recession from the lingual side is a late complication. The severity and prevalence of gingival recession increase with age, poor hygiene, lingual orthodontic appliances, anatomical features (tongue frenulum, thin biotype), intraoral piercings (chronic impact of the traumatic factor), and iatrogenic factors. Nevertheless, the causes of localized recession on the lingual side remain poorly understood and

further research is needed.

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Declaration of Interest

The authors have no conflicts of interest. Peoples Friendship University of Russia named after Patrice Lumumba (RUDN University) 6 Miklukho-Maklaya Street, Moscow, 117198, Russian Federation.

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